Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. to 3. (Cancelled)

4. (Previously Presented)The display of claim 12 wherein each of the light-emitting elements of the light source corresponds to eight or more corresponding controllable elements of the spatial light modulator.

5. (Original) The display of claim 4 wherein each light-emitting element of the light source corresponds to 145 or fewer corresponding controllable elements of the spatial light modulator.

6. (Previously Presented) The display of claim 12 comprising a diffuser located intermediate the light source and the spatial light modulator.

7. (Previously Presented) A display comprising:

a light source comprising a two-dimensional array of light-emitting elements each having a controllable light output; and

a spatial light modulator comprising a plurality of controllable elements located to modulate light from the light source;

wherein:

the spatial light modulator has more controllable elements than the light source has light-emitting elements;

each of the light-emitting elements of the light source is located to illuminate a plurality of corresponding controllable elements of the spatial light modulator; and

the display comprises a grid of reflective walled channels located intermediate the light source and the spatial light modulator.

8. (Original) The display of claim 7 wherein the reflective walled channels are hexagonal and arranged in a honeycomb structure.

9. (Previously Presented) The display of claim 7 wherein each of the light-emitting elements emits light into one of the reflective-walled channels.

10. (Previously Presented) The display of claim 7 wherein each of the controllable elements of the spatial light

modulator is illuminated by light from only one of the reflective-walled channels.

11. (Previously Presented) The display of claim ~~3~~ 12 comprising a diffuser located between the spatial light modulator and a viewing position.

12. (Previously Presented) A display comprising:

a light source comprising a two-dimensional array of light-emitting elements each having a controllable light output; and,

a spatial light modulator comprising a plurality of controllable elements located to modulate light from the light source;

wherein:

the spatial light modulator has more controllable elements than the light source has light-emitting elements;

each of the light-emitting elements of the light source is located to illuminate a plurality of corresponding controllable elements of the spatial light modulator; and

at the spatial light modulator, a distribution of light incident from each of a plurality of the light-emitting elements of the light source comprises a convolution of a rectangular distribution and a spread

function wherein the spread function has a full width at half maximum in the range of $0.3\times d_2$ to $3\times d_2$, where d_2 is a center-to-center spacing on the spatial light modulator of distributions of light modulated by adjacent light-emitting elements of the light source.

13. (Cancelled)

14. (Previously Presented) A display comprising:

a light source comprising a two-dimensional array of light-emitting elements each having a controllable light output; and,

a spatial light modulator comprising a plurality of controllable elements located to modulate light from the light source;

wherein:

the spatial light modulator has more controllable elements than the light source has light-emitting elements;

each of the light-emitting elements of the light source is located to illuminate a plurality of corresponding controllable elements of the spatial light modulator; and,

the light-emitting elements of the light source each have a number N of discrete selectable brightness levels, and the controllable elements of the spatial

light modulator have a number ***M*** of discrete selectable brightness levels and ***N>M***.

15. to 20. (Cancelled)

21. (Previously Presented) The display of claim 12 wherein, a ratio of luminance of a first point, for which a corresponding light-emitting element is at a maximum light output and a corresponding element of the spatial light modulator is set to provide maximum illumination, and a second point, for which the corresponding light-emitting element is at minimum light output and the corresponding element of the spatial light modulator is set to provide minimum illumination, exceeds 1000:1.

22. (Previously Presented) The display of claim 12 wherein, a ratio of luminance of a first point, for which a corresponding light-emitting element is at a maximum light output and a corresponding element of the spatial light modulator is set to provide maximum illumination, and a second point, for which the corresponding light-emitting element is at minimum light output and the corresponding element of the spatial light modulator is set to provide minimum illumination, exceeds 1500:1.

23. (Previously Presented) The display of claim 12 wherein each of the light-emitting elements comprises a solid state light emitting element.

24. (Original) The display of claim 23 wherein the solid state light emitting elements comprise light emitting diodes.

25. (Previously Presented)A display comprising:

a light source comprising a two-dimensional array of light-emitting elements each having a controllable light output;

a spatial light modulator comprising a plurality of controllable elements located to modulate light from the light source;

wherein:

the spatial light modulator has more controllable elements than the light source has light-emitting elements;

each of the light-emitting elements of the light source is located to illuminate a plurality of corresponding controllable elements of the spatial light modulator;

each of the light-emitting elements comprises a solid state light emitting element;

the solid state light emitting elements comprise light emitting diodes; and,

the light emitting diodes emit white light.

26. (Original) The display of claim 23 wherein a color of light emitted by the solid state light emitting elements is controllable.

27. (Cancelled)

28. (Previously Presented) The display of claim 12 wherein the controllable elements of the spatial light modulator comprise liquid crystal display elements.

29. (Previously Presented) The display of claim 25 wherein the spatial light modulator comprises a color spatial light modulator.

30. (Original) The display of claim 29 wherein each controllable element of the spatial light modulator comprises a plurality of color sub pixels.

31. (Previously Presented) The display of claim 25 comprising a controller connected to deliver image data to both the light source and the spatial light modulator.

32. (Original) The display of claim 31 wherein the controller is configured to periodically refresh the controllable elements and to dim or turn off the corresponding light emitting element while a controllable element is being refreshed.

33. (Previously Presented) The display of claim 31 comprising a light detector coupled to receive stray light from at least one of the light-emitting elements and to generate a stray light intensity signal indicative of an intensity of the stray light wherein the controller is configured to: receive the stray light intensity signal; determine a current correction for the at least one of the light-emitting elements based at least in part on the intensity of the stray light from the at least one of the light-emitting elements and a reference value; and, use the current correction in controlling the at least one of the light-emitting elements.

34. (Previously Presented) The display of claim 31 wherein upon determining that a defective one of the light-emitting elements is not operating, the controller is configured to increase intensities of other light-

emitting elements adjacent to the defective one of the light-emitting elements.

35. (Previously Presented) The display of claim 31 wherein upon determining that a defective one of the light-emitting elements is not operating, the controller is configured to increase a transmissivity of those of the controllable elements which correspond to the defective light-emitting element.

36. (Previously Presented) The display of claim 25 wherein the light-emitting elements are arranged in a regular array.

37. (Previously Presented) The display of claim 39 wherein the array is a rectangular array.

38. (Previously Presented) The display of claim 39 wherein the array is a hexagonal array.

39. (Previously Presented) A display comprising:

a light source comprising a two-dimensional array of light-emitting elements each having a controllable light output;

a spatial light modulator comprising a plurality of controllable elements located to modulate light from the light source;

wherein:

the spatial light modulator has more controllable elements than the light source has light-emitting elements;

each of the light-emitting elements of the light source is located to illuminate a plurality of corresponding controllable elements of the spatial light modulator;

the light-emitting elements are arranged in a regular array; and,

the display comprises light barriers disposed between adjacent ones of the light-emitting elements.

40. (Previously Presented) A display according to claim 25 comprising a control circuit for individually varying the controllable light outputs of the light-emitting elements by varying duty cycles of the light-emitting elements.

41. (Previously Presented) A display according to claim 25 comprising a control circuit for individually varying the controllable light outputs of the light-emitting elements by varying electrical driving currents delivered to the light-emitting elements.

42. (Original) A display according to claim 33 wherein the light detector is coupled to receive the stray light by a planar waveguide.

43. (Original) A display according to claim 42 wherein the light-emitting elements are received in apertures of the planar waveguide and the waveguide captures light emitted by the light-emitting elements in a sideways direction.

44. (Original) A display according to claim 43 wherein the planar waveguide is located behind the light-emitting elements.

45. (Previously Presented) A display according to claim 31 comprising a planar waveguide located in front of the light-emitting elements and a light sensor coupled to the planar waveguide to detect light emitted by the light-emitting elements.

46. (Original) A display according to claim 45 wherein one surface of the planar waveguide is roughened sufficiently to direct a fraction of light emitted by the light-emitting elements into the planar waveguide.

47. to 56. (Cancelled)

57. (Previously Presented) A display according to claim 7 wherein the light-emitting elements comprise light emitting diodes which emit white light.

58. (Previously Presented) A display according to claim 12 wherein the light-emitting elements comprise light emitting diodes which emit white light.

59. (Cancelled)

60. (Previously Presented) A display according to claim 14 wherein the light-emitting elements comprise light emitting diodes which emit white light.

61. (Previously Presented) A display according to claim 39 wherein the light-emitting elements comprise light emitting diodes which emit white light.

62. (New) The display according to Claim 12, wherein:

the light-emitting elements comprise white light emitting Light Emitting Diodes (LEDs); and

the display further comprises a video control circuit configured to receive an image signal, and, based on the image signal, provide a backlight control signal configured to locally dim portions of the LED array.

63. (New) The display according to Claim 62, wherein:

the spatial light modulator comprises an LCD panel; and

the video control circuit further configured to, based on the image signal, provide an LCD control signal configured to adjust the LCD panel to modulate the locally dimmed light from the LED array so that a resulting image viewed on the LCD panel approaches a desired image carried by the image signal.

64. (New) The display according to Claim 12, wherein:

the spatial light modulator comprises an LCD panel; and

the display further comprises a video control circuit configured to receive an image signal, and, based on the image signal, provide an LCD control signal configured to adjust the LCD panel to modulate light from the light emitting elements so that a resulting image viewed on the LCD panel approaches a desired image carried by the image signal.

65. (New) The display according to Claim 12, wherein:

the spatial light modulator comprises an LCD panel, and the light source comprises a two-dimensional

array of Light Emitting Diode (LED) based white light-emitting sources; and

the display further comprises a video control circuit configured to receive an image signal, and, based on the image signal, provide a backlight control signal configured to locally dim portions of the LED based white light-emitting sources when applied to the LED based white light-emitting sources, and an LCD control signal configured to set a transmissivity in each pixel of the LCD panel when applied to the LCD panel, said transmissivity of each pixel of the LCD panel being an amount to modulate each pixel at the LCD panel such that a low resolution image provided by the LED based white light-emitting sources is transformed by modulation according to the LCD panel so that an image viewed on the LCD panel approaches a desired image.

66. (New) The display according to Claim 65, wherein pixels of the light source are common to a plurality of pixels of the spatial light modulator, and the LCD control signal is configured to control the higher-resolution spatial light modulator to reduce artefacts which result from the fact that each pixel of the lower-resolution light source is common to a plurality of

pixels of the higher-resolution spatial light modulator.

67. (New) The display according to Claim 65, wherein pixels of the light source are of a lower resolution than pixels of the spatial light modulator, and the LCD control signal is configured to control the higher-resolution spatial light modulator to reduce artefacts which result from the fact that the spatial light modulator has more controllable elements than the light source has light-emitting elements.

68. (New) The display according to Claim 12, wherein the light emitting elements adjust light intensity in coarser steps than the controllable elements of the spatial light modulator.

69. (New) The display according to Claim 65, wherein the backlight control signal is configured to adjust intensity of the light emitting elements over a predetermined intensity range in a predetermined number of steps and the LCD control signal is configured to adjust intensity of the controllable elements of the spatial light modulator over a similar intensity range in a number of steps greater than the predetermined number of steps.

70. (New) The display according to Claim 12, wherein the light emitting elements are configured to be adjusted over an intensity range in a predetermined number of steps and the controllable elements of the spatial light modulator are configured to be adjusted over a similar range of intensity in a number of steps greater than the predetermined number of steps.

71. (New) The display according to Claim 70, wherein the controllable elements of the spatial light modulator are configured to be adjusted over the intensity range in 512 steps.

72. (New) The display according to Claim 12, wherein the illumination of the controllable light elements on the spatial light modulator comprises an approximation of a desired image.

73. (New) A display comprising:

a light source comprising a two-dimensional array of light-emitting elements each having a controllable light output; and,

a spatial light modulator comprising a plurality of controllable elements located to modulate light from the light source;

wherein:

the spatial light modulator has more controllable elements than the light source has light-emitting elements;

each of the light-emitting elements of the light source is located to illuminate a plurality of corresponding controllable elements of the spatial light modulator;

at the spatial light modulator, a distribution of light incident from each of a plurality of the light emitting elements of the light source comprises a convolution of a rectangular distribution and a spread function wherein the spread function has a full width at half maximum in the range of $0.3 \times d_2$ to $3 \times d_2$, where d_2 is a center-to-center spacing on the spatial light modulator of distributions of light modulated by adjacent light-emitting elements of the light source;

the light source comprises a two-dimensional array of Light Emitting Diode (LED) based white light-emitting sources;

the display further comprising a video control circuit configured to receive an image signal, and, based on the image signal, provide a backlight control signal configured to locally dim portions of the LED array;

the spatial light modulator comprises an LCD panel;

the video control circuit further configured to, based on the image signal, provide an LCD control signal configured to adjust the LCD panel to modulate the locally dimmed light from the LED array so that a resulting image viewed on the LCD panel approaches a desired image carried by the image signal;

the backlight control signal further configured to adjust light intensity of the light-emitting elements in coarser steps than the LCD control signal is configured to adjust light intensity of the controllable elements of the spatial light modulator;

the backlight control signal configured to adjust intensity of the light emitting elements in a predetermined number of steps and the LCD control signal configured to adjust intensity of the controllable elements of the spatial light modulator in a number of steps greater than the predetermined number of steps; and

the illumination of the controllable light elements on the spatial light modulator comprises an approximation of a desired image.

74. (New) The display according to Claim 73, wherein the predetermined number of steps of the backlight control signal control intensity over a similar range of

intensity as the greater number of steps configured in the LCD control signal.

75. (New) The display according to Claim 73, wherein the LCD control signal is configured to control the controllable elements of the spatial light modulator in 512 steps of intensity.

76. (New) The display according to Claim 73, wherein each pixel of the light source is common to a plurality of pixels of the spatial light modulator, and the LCD control signal is configured to control the spatial light modulator to reduce artifacts which result from the fact that each pixel of the light source is common to a plurality of pixels of the spatial light modulator.

77. (New) The display according to Claim 73, wherein the light control signals are based on an averaging function of the desired image.

78. (New) The display according to Claim 77, wherein the averaging function is a weighted average.

79. (New) The display according to Claim 73, wherein the distribution is based on a rectangular profile having a

width d_1 equal to an active width of the pixel and d_1 is approximately equal to d_2.

80. (New) The display according to Claim 73, wherein the display comprises a locally-dimmed flat-panel LCD high dynamic range display having a dynamic range of 800:1 or greater.